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ABSTRACTS OF WATER WORKS LITERATURE

FRANK HANNAN

Key: American Journal of Public Health, **12:** 1, 16, January, 1922. The figure 12 refers to the volume, 1 to the number of the issue, and 16 to the page of the journal.

Streamflow Experiment at Wagon Wheel Gap, Colorado. CARLOS G. BATES AND ALFRED J. HENRY. Monthly Weather Review, Supplement, no. 17, 1922. In order to make a complete study of the effects of forest cover on streamflow and erosion, the Forest Service, United States Department of Agriculture, selected a site for experiment on the Rio Grande National Forest, near Wagon Wheel Gap, Colorado. The plan was to select two contiguous watersheds, similar in topography and forest cover; to observe carefully the meteorological conditions and the stream flow for a term of years, under similar conditions of forest cover; then, to denude one of the watersheds of its timber and to continue the measurements as before for an indefinite period, or until the effects of forest destruction had been determined. The watersheds selected are noted as *A* and *B*.

Both drainage basins are almost completely covered with a relatively thin mantle of soil and decomposed rock, with some clay and numerous flat fragments of the underlying augite-quartz latite. The forest cover consists of Douglas fir, bristlecone pine and aspen.

The mean 1-foot soil temperature of watershed *B* is 2° higher than in the case of watershed *A*, while the temperature of all the springs on *B* is 0 .6° less than that of the springs on *A*, at midsummer. In winter the stream on *B* is warmer than the stream on *A*, all of which indicates that the water sources of *B* are deeper than those of *A*.

The average precipitation over a period of eight years is practically divided between rain and snow. The interception of snow by trees and vegetation is small as compared with rain, because the coniferous area only is effective in preventing the snow from reaching the soil. Although the average snowfall is equal to the rainfall a greater portion of it percolates into the deeper soil and is later effective in maintaining streamflow. Amounts of precipitation for the two watersheds for eight years are almost the same, but in individual years they show considerable variation. The amount of water discharged by stream *B* is, on the whole, about 2 per cent greater than that for stream A. Evaporation is probably less on *B*, either because of the cover conditions or because *B* has a deeper and better storage reservoir, or both.

In 1919, after eight years (1911–1919) of continuous experimenting and recording of the precipitation, temperatures, etc., the process of denuding watershed *B*, was started, the experimenting, measuring and recording being continued as before.

The report contains valuable discussions of the various elements entering into the calculations of the relation between run-off and rainfall on the streams.—*A. W. Blohm.*

An Ancient Aqueduct in Brazil. S. T. HENRY. Successful Methods, **4:** 3, March 1922. Built about one hundred and fifty years ago, a 7-mile masonry aqueduct was in continuous service until recently, supplying water to Rio de Janeiro. Aqueduct shows wonderful construction skill. Troughs were hewn out of solid blocks of stone, lined with terra cotta tile set in mortar. Side walls and arched-top were constructed to protect the conduit and water. All this was done with slave labor, in a dense tropical jungle far removed from the civilization of the day and with the crudest of hand tools.—*A. W. Blohm.*

Water Intake Protected Against Severe Conditions. Eng. News-Record, **88:** 6, 235, February 9, 1922. An extreme water level variation of 71 feet in the Ohio River, combined with the exceptional accumulation of debris, has led to the introduction of special plant for screening the water and removing the debris at the intake well of the West End Power Station of the Union Gas and Electric Company at Cincinnati, Ohio. This plant includes the largest installation of traveling screens in the world, having 16 screens 91 feet high and also a novel swinging crane for cleaning the well. Particulars of the intake well and tunnel to supply water at the rate of 208,000 gallons per minute were given in Eng. News-Record, September 27, 1919, 593.—*E. E. Bankson.*

Synura and Other Organisms in Catskill Water Supply. WM. W. BRUSH. Eng. News-Record, **88:** 7, 266, February 16, 1922. Experience with taste and odor producing organisms reviewed. The taste has usually been designated as resembling a ripe cucumber, although many have designated it as fishy. The article outlines the unusual and successful methods of applying copper sulphate and chlorine to destroy not only these organisms, but also the taste and odors resulting therefrom with conclusions as follows: (*a*) Continuous treatment of the flow in the aqueduct with copper sulphate will destroy the microscopic organisms, (*b*) The addition of chlorine after the copper sulphate will destroy the tastes of the synura oil when sufficient chlorine is added. (*c*) A combination of copper sulphate and chlorine treatment of water high in microscopic organisms appears to be a satisfactory method of elimination of organisms and taste.—*E. E. Bankson.*

Waterproofing a Leaky Reservoir at Nashville, Tennessee. Eng. News-Record, **88:** 8, 311, February 23, 1922. A lining composed of two layers of gunite with asphaltic burlap membrane between them is the means adopted for waterproofing the masonry walls of the leaky reservoir. The membrane was extended over the concrete floor and covered with 4 inches of poured concrete.—*E. E. Bankson.*

Steel Standpipe Cleaned and Reinforced by Cement Gun. Eng. News-Record, **88:** 8, 315, February 23, 1922. In the recent cleaning and repair of a high steel standpipe a cement gun was used both to sand blast the corroded metal and to coat it with a mortar lining. The standpipe was first cleaned inside and out by the cement gun used as a sand blast, angle clips were then welded to the steel plates and heavy reinforcing wire mesh used throughout. Gunite was then shot into place, forming a continuous sheet over the bottom and walls.—*E. E. Bankson.*

The British Water Supply Shortage and Emergency Treatment Measures. London Correspondence. Eng. News-Record, 88: 8, 332, February 23, 1922. British authorities have now become thoroughly alarmed at the shortage of water throughout the country and are taking steps to insure that all supplies are conserved. In many districts water rationing has been resorted to and in many villages water is being retailed at so much per pail. Several rivers have dried up altogether and many deep seated chalk springs have completely dried up.—*E. E. Bankson.*

The Advantage of Maintaining Accurate Accounts by Utilities Subject to Regulation. WALTER H. BOHLING. Bull. Missouri Association of Public Utilities, 8: 3, 7, February 15, 1922. That regulation may be more intelligently and efficiently administered the books of the individual utilities of Missouri are required to speak a common language reflecting like expenditures and income in like manner, under the uniform systems of accounts prescribed by the Public Service Commission. Intelligent regulation depends primarily upon the value of the property, the costs of rendering the service and the revenue derived therefrom.—*E. E. Bankson.*

What Constitutes a Reasonable Return. W. H. BOWLING. Bull. Missouri Association of Public Utilities, 8: 3, 16, February 15, 1922. The point at which confiscation begins, marks the border line in valuation and rate fixing for fixing public utilities, is discussed in this article under headings as follows: (1) Introductory, (2) General, (3) Cost of money, (*a*) Interest rate on utility securities, (*b*) Legal rate of interest, (*c*) Prevailing rate of interest, (4) Prevailing return on comparable enterprises, (5) fluctuations. Exhaustive citation of legal decisions bearing on this aspect of successful utility operation is given.—*E. E. Bankson.*

The Cross Hill Covered Reservoir. Water and Water Eng. (London), 23: 275, 401, November, 1921. The claim is made that this reservoir is of unique design and probably the most economical one ever constructed. The contract was let in 1913 for 79,000 pounds or about 2800 pounds per million gallons of storage as compared with an average cost of 5000 pounds for several small covered service reservoirs built for the London water supply. The reservoir is hexagonal in shape, each side of which has eight arches, with a span of 30 feet and a radius of 27 feet 6½ inches, and a span and radius of 17 feet 4½ inches at the angles. It covers 3.6 acres and has a capacity of 30,000,000 gals. The total depth is 32 feet of which 5 feet is below ground level. The roof consists of 217 concrete domes, each 30 feet in diam., supported on 432 pillars built of hexagonal concrete blocks. The latter are 18 inches deep and 3 feet across between parallel sides, and 16 are used for each column. The blocks were vibrated during the process of moulding in order to insure a satisfactory and uniform quality of concrete. Tests showed that the vibrating increased the crushing strength about 6 per cent. The article is well illustrated by photographs.—*Geo. C. Bunker.*

Notes on the Examination and Disinfection of Drinking Water. J. MORISON. Indian Jour. Med. Research (Special Indian Science Congress Number, 1920). Tropical Diseases Bull., Sanitation Supplement, no. 3, 204, October, 1921. The bacteriological examinations in practice may be limited to the estimation of lactose fermenters and the total count on agar. The bacteriological standard for a water whose source is beyond suspicion should be its constancy. When a water supply is liable to pollution and hence requires treatment only one bacteriological standard is permissible, i.e., that the water should be as nearly as possible sterile. There should be no lactose fermenters in 100 cc. and less than 5 colonies per cubic centimeter on agar (temperature not given). This standard is aimed at in the London supply and is easily attained with the aid of hypochlorite or chlorine in any moderately efficient filter or chemical precipitation plant. The author's definition of a suitable water supply is; "It is one which is free from objectionable mineral salts and which can be rendered clear and 'sterile' by a cheap process without acquiring a taste which is itself objectionable. A properly treated water is one which is comparable to distilled water in clarity and which has been rendered 'sterile.'" The function of a purification plant is simply to clarify the water to equal distilled water, the percentage reduction of bacteria being quite unimportant as hypochlorite or chlorine properly applied can be depended upon to deal with the bacterial life. To bring Thames water to the London standard Houston found that available chlorine might require to be detected for 5 hours after the addition of the dose.—*Geo. C. Bunker.*

Indicating and Recording Instruments. C. FRANCIS NEWTON. Water and Water Eng. (London), 23: 276, 441, December, 1921. (Cf. Proc. Inst. Wat. Eng. London, 1921.) The following instruments normally in use in water works are described: level indicators, difference in level indicators, pressure gages, flow indicators and recorders, and integrators.—*Geo. C. Bunker.*

Elbe Water Pollution. W. P. DUNBAR. Gesundheits-Ingenieur, 44: 81-7, 155–63, 165–168. Water and Water Eng. (London), 23: 275, 429, November, 1921. The water supply of Hamburg normally consists of four parts of river water and one part of ground water. Wastes from chemical works have rendered the hardness and saltness of the river water excessive. To keep the water supply within prescribed limit of hardness and chloric acid content the wastes must be kept out of the river.—*Geo. C. Bunker.*

Bacillus Welchii in a Public Water Supply as a Cause of Intestinal Disease. HERBERT B. LARNER. Jour. Amer. Med. Assoc., 78: 4, 276, January 28, 1922. As a result of 187 cases of intestinal disorder reported early in 1921 in Montclair, New Jersey, the local Board of Health issued a warning to boil the water taken from the water supply for drinking purposes. Montclair is furnished with filtered and chlorinated water from the Little Falls, New Jersey purification plants. Symptoms included fever, vomiting, diarrhea, intestinal fermentation and headache. B. welchii were found almost continuously in the water supply during January and February, 1921. Bacteriological examinations of specimens of faeces from sick persons showed an organism similar to, if not identical with, the organism in the water supply. While the evidence was not sufficiently satisfactory to show that B. welchii caused the cases of intestinal disorder, the author states it is extremely significant that the cases in February, 1921, had many points in common with approximately 2000 cases of intestinal disease in January, 1918, during which outbreak large numbers of this organism were found in the water supply. The final conclusion of the author is that, until qualified medical experts have decided whether or not B. welchii is pathogenic, "we should be extremely cautious about accepting as potable a water which contains the organisms in any such quantities as they have been demonstrated in the water served to Montclair."—*Geo. C. Bunker.*

Is Water Chlorination Effective Against All Water-Borne Disease? EDITORIAL. Jour. Amer. Med. Assoc., 78: 4, 283, January 28, 1922. A discussion of the questions raised by the preceding article in the same issue of this Journal. While chlorination of water supplies has been remarkably efficient in doing away with the dangers of water-borne typhoid, it is plain that dependence on the chlorine treatment of highly polluted waters is to some degree unjustifiable if spores of certain pathogenic organisms are so resistant to chlorine that large enough numbers survive to cause extensive outbreaks of intestinal disease. Preliminary purification should precede chlorination in the case of water supplies polluted with large amounts of sewage. If the spores of B. welchii or of some similar anaerobic organism can withstand chlorine treatment, it may be desirable to make tests for such organisms in addition to those for B. Coli. The significance of "stormy fermenters" in chlorinated water supplies is not known and it must not be "too readily assumed" that they are the cause of gastro-intestinal outbreaks. The pathogenicity of B. welchii has not been demonstrated conclusively by feeding experiments both on monkeys and on man himself.—*Geo. C. Bunker.*

Adsorption in Sand Filters. JOHN DON. Water and Water Eng. (London), 23: 276, 448, December, 1921. (Cf. Proc. Inst. Wat. Eng. London, 1921). A discussion of the decrease of ammonia and organic matters in water filtered through slow sand filters is followed by laboratory experiments made to find out how far the granules of sand with their watery envelopes are able to assist in purifying water from dissolved materials. The author concludes from his experiments that a sand filter freshly prepared is capable of adsorbing fairly large amounts of ammonia and dissolved organic substances, and that this action takes place rapidly.—*Geo. C. Bunker.*

Detection of Fluorescein in Water. L. LOMBARD. (Procede de Recherche de la Fluoresceine dans ses Solutions tres Etendues). Bull. de la Societe Chimique de France, no. 29, 462, 1921. (Cf. Water and Water Eng. (London) 23, 276, 477.) Fluorescein may be detected in extremely dilute solutions by acidifying 30 cc. of the water with a few drops of sulphuric acid, or by hydrochloric acid free from chlorine, then shaking with ether sufficient to yield a layer of 3 mm. to 4 mm.; after the addition of a little ammonia, the mixture is again shaken; if fluorescein be present, the layer of ether shows green before a dark background. After standing, the fluorescein, more soluble in water than in ether, will tinge the surface of the water. By this method it is possible to detect one part in 200,000,000.—*Geo. C. Bunker.*

Acid Proof Coatings for Concrete Surfaces. Edward H. Berger. Concrete, 16: 6, 276, June, 1920. A discussion of acid proof coatings for concrete tanks in which solutions of alum, acids, alkalis, and other chemicals are stored. Bituminous paints may be used on rather smooth walls and when exposed to mineral acids of low concentration. For acids of the lower concentrations the kind of base is immaterial. Bituminous enamels may be used on both smooth and rough walls and when exposed to relatively strong acids. A priming solution is first applied, followed by the enamel. Bituminous mastics are used for floors and are of two kinds depending upon cold or hot application. Specifications for the various materials are given as well as directions for their application.—*Geo. C. Bunker.*

Water from Missouri River Advised to Increase St. Louis Supply. Edward E. Wall. Eng. News-Record, 88: 437, 1922. Additional water supply for St. Louis taken from the Missouri River 8 miles above St. Charles, Missouri, is recommended. The cost of the new works is estimated at $22,000,000 yielding 120,000,000 gallons daily in 1960. This project and the present one at Chain of Rocks will yield 240,000,000 gallons daily in 1960 for an estimated population of 1,500,000.—*Frank Bachmann (courtesy Chem. Abstracts).*

Interstate Water Supply Certification. Anonymous. Eng. News-Record, 88: 449 (1922). Of the 3102 sources of water supply of interstate carriers on records of the United States Public Health Service, 42 per cent were certified as satisfactory; 11 per cent provisionally; 5 per cent classed as polluted; and no rating for 42 per cent due to lack of personnel. The country is divided into 9 sanitary districts, each district being in charge of a sanitary engineer of the Service.—*Frank Bachmann (courtesy Chem. Abstracts).*

Broken Section of 36-inch Pipe Line Burned Out by Electric Torch Under 50 Feet of Water. William W. Brush. Eng. News-Record, 88: 346–8 (1922). A section of a 36 inch flexible-joint, cast iron pipe line conveying Catskill water from Brooklyn to Staten Island, New York was removed and replaced by means of a specially designed torch (Merritt and Chapman). The cutting of the pipe took place in 50 feet of water. The torch consists of a carbon electrode which is bored for the passage of cutting gas, the carbon being connected to one pole of a generator the other pole grounded through the water to the metal to be cut. Current required is about 350 amperes at 60–100 volts. The metal is volatilized by means of the cutting gas administered at the point of the arc. A cast steel sleeve made the joint where old and new pipe lengths met.—*Frank Bachmann.*

State May Not Dictate Pure Water Source. Anonymous. Eng. News-Record, 88: 409 (1922). According to a decision of the Court of Appeals (Prunell et al. vs. Maysville Water Company, 234 S. W., 967) the State Board of Health of Kentucky has power to require a water company in that State to stop supplying impure water, but has no power to dictate the means that shall be employed to provide pure water. The decision is broad in that it applies to the abatement of any nuisance that is a menace to health.—*Frank Bachmann (courtesy Chem. Abstracts).*

A $60,000,000 Addition to Boston District Water Supply. Joint Board. Eng. News-Record, 88: 360–3 (1922). Report by the Joint Board recommends the construction of a tunnel to divert the flood flow of the Ware River to the Wachusett reservoir, thus providing an additional 33,000,000 gallons per day for the Boston Metropolitan District and the City of Worcester. The run-off above 1.2 section feet per square mile from Ware, Swift and Millers Rivers to be stored in a 410,000,000,000 gallons reservoir. Water supplies of other sections of the State are considered.—*Frank Bachmann* (*courtesy Chem. Abstracts*).

Revamping the Artesian Water Supply of Bryan, Ohio. A. H. Smith Co. Eng. News-Record, 88: 351 (1922). The water supply is obtained from 8 artesian wells connected to a 10 inch suction line 2100 feet long. Previous to 1921 the suction line was connected to the centrifugal pumps supplying the town by direct pressure. The installation of a 1,000,000-gallon reservoir gave a fire reserve and restored and steadied the flow of privately owned wells in the city. Of the 865 taps, 98 per cent are metered. Consumption is estimated at 100 gallons per capita.—*Frank Bachmann.*

An Interesting Water Works Decision. Editorial, Fire and Water Eng., 71:8, 330, February 22, 1922. Nebraska supreme court reverses decision of department of public works, and gives permit to city of Chadron. Waterworks system was completed before application for permit.—*A. W. Blohm.*

Parks Around Water Supplies and Filter Plants. Editorial, Fire and Water Eng., 71: 11, 450, March 15, 1922. Plan of utilizing the grounds surrounding reservoirs, pumping stations, filter plants, etc., as public parks is gaining favor among patrons of water systems.—*A. W. Blohm.*

Forestation of Watersheds. Editorial, Fire and Water Eng., 71: 13, 531, March 29, 1922. Proper forestation of watersheds considered important, where supply is taken from mountain streams, springs, etc. Study of proper trees to replace dead or decayed trees on watershed, a science with which waterworks superintendents should be familiar.—*A. W. Blohm.*

Some Facts About Residual Alum in Filtered Water. A. M. Buswell and G. P. Edwards. Chem. and Met. Eng., 26: 826–829, May 3, 1922. The laboratory of the State Water Survey Division, Ill., undertook in 1920 an investigation of the various reactions involved in water purification when alum is used as a coagulant. The investigation showed that pH determinations alone are not sufficient for determining the optimum conditions for precipitation of aluminum hydroxide. Over 20 filter plants in different parts of Illinois were visited in collecting the data. None of the chemical reactions of alum go to completion, as there are a number of reversible reactions, each of which depends for its final equilibrium upon all the others. Any secondary reaction which tends to remove a product of a primary reaction will increase the amount of the primary reaction in the direction of the formation of the removed product. A chart is given representing such complex systems, showing the interdependence of these reactions. It also emphasizes that in each of these equilibria the hydrogen-ion plays a part. Three conditions might affect the relation between alum and alkalinity. The loss of CO_2 with the precipitation of $CaCO_3$ may cause a decrease in alkalinity, the addition of lime may cause a net decrease in alkalinity due to this same precipitation of $CaCO_3$, and the formation of colloidal alumina instead of the precipitate tends to offset the decrease in alkalinity. At 4 of the 19 plants studied the decrease in alkalinity corresponds to 8 mg. per liter per grain per gallon of alum used, at 9 plants the decrease was greater than the calculated, and at 6 plants the decrease was less. A table showing the amounts of residual alumina present in the raw and filtered water of these 19 cities is given. With a fairly wide range of pH value there is no case in which the alumina in the effluent reaches zero. In the diagrammatic representation of the chemical reactions given, $H+$, AlO_3H_2-, $Al(OH)_3$, $Al+++$ and $OH-$ form a cycle. The reactions may be made to take place in either direction depending on the concentrations employed. Points plotted with residual alum and pH values as coördinates indicated a minimum alumina at a pH of 6.—*John R. Baylis.*

On the Design of Rain-Gages. S. P. Ferguson. Monthly Weather Review, 50: 2, 82, February, 1922. The paper includes a statement of the essential characteristics of rain-gages approved by the British Meteorological Office, which are:

1. The stout brass turned ring terminating upwards in a knife-edge, exactly 5 or 8 inches in diameter, which forms the rim of the gauge.

2. The vertical cylinder 4 to 6 inches deep, extending from the rim to the upper edge of the funnel, which is intended to retain snow and hail, to prevent the outsplashing of rain which has fallen upon the funnel and to reduce to a minimum the risk of loss due to wind eddies.

3. An inner collecting vessel, which can be removed for measuring the fall without disturbing the body of the gauge. Taps for drawing off water are extremely objectionable.

4. Provision for a depth of at least 6 inches of the body to be firmly fixed in the ground.

5. Simplicity of construction and avoidance of the use of rivets.

6. Strength and durability.

7. A capacity of not less than 10 inches of rain for a daily gauge. Gauges for monthly readings should be larger according to the district in which they are to be used.

The above conditions, with the exception of that numbered (3), apply generally also to self-recording rain gauges, it being noted, however, that the diameter of the rim of modern British recording gauges is usually either 6, 8, or 11 inches. Condition (5) is most important, and the following further desiderata apply:

8. The scale values of the chart must conform accurately with the indications of the instrument.

9. It is desirable that the hour lines on the chart should be straight and not curved.

10. It is desirable that the scale value for rainfall should be not less than six times the natural scale, and that the drum should make a complete revolution in 24 hours.

11. Dial gauges, tipping-bucket, and electrical-recording rain gauges are not in general suited to modern requirements.

12. Should the mechanism of the gauge include an automatic syphon, the design and construction of the syphon require special care; the liability to failure of syphons is a serious drawback.

13. Space should be available inside the case of the instrument for the insertion of a small oil lamp or a night light to warm the gauge in frosty weather.

The writer's experience in New England and the West corroborates the foregoing conditions.—*Isador W. Mendelsohn.*

Disinfection Studies—The effect of temperature and hydrogen ion concentration upon the viability of B. coli and B. typhosus in water. Barnett Cohen. Jour. Bact., 7: 183–230, March, 1922. The mortality of bacteria in distilled or tap water is variable and coincident with insignificant pH variations. Controlling the pH by means of buffer solution stabilizes this variability. At constant pH the relative resistance of B. coli and B. typhosus decreases with rise in temperature from 0°: 10°: 20°: 30° in the ratio of 67: 51: 18: 8. At 20°C., B. typhosus possesses the greatest tolerance within a narrow zone of hydrogen ion concentration (pH 5.00 to pH 6.4). A slight increase in acidity beyond the zone results in conditions of maximum mortality. For B. coli the zone is wider and centers about absolute neutrality (pH 7.0). The mortality of bacteria whether by strong disinfectants or by milder agents follows the laws of logarithmic decline.

Bacteria do not begin to die off at a maximum rate, but the mortality increases to a maximum gradually, depending upon the pH and temperature. The lower the temperature and the less extreme the acidity or the alkalinity the greater is the duration of this period.

There is a wealth of data plotted in the form of curves which illustrate and make clear the fact that B. coli is much more resistant in any water than is B. typhosus.—*L. H. Enslow.*

Hydrogen Ions, Titration and the Buffer Index of Bacteriological Media. J. H. Brown. Jour. Bact., 6: 521–23, November, 1921. A hydrogen ion concentration determination alone will not reveal facts that titration in conjunction therewith, will.

For many purposes a knowledge of the buffer content of media is of equal import with that of the hydrogen ion concentration. The buffer content, described as the "buffer index," is the sum of the "reserve acidity" and "reserve alkalinity" between stated limits of hydrogen ion concentration. The term "reserve acidity" is defined as that amount of alkali required to change the H.I.C. from the initial reaction to a stated lesser H.I.C. (say pH 8.0). The "reserve alkalinity" is that amount of acid required to change the pH from the initial reaction to a stated greater H.I.C. (say pH 5.0). The "buffer index" (in this case B. I. of pH 8 to pH 5) is the sum of the "reserve alkalinity" and "reserve acidity" each value being expressed in per cent of normal acid or alkali. Appended to the paper is a simple laboratory method of determining these values, and also a convenient form of record.—*L. H. Enslow.*

The Nature of Acid Water from Coal Mines and the Determination of Acidity. W. A. Selvid and W. C. Ratliff. Jour. Ind. and Eng. Chem., **14**: 125–28, February, 1922. Data given show the erroneous results obtained when attempting a titration of "free" acid in waters containing a considerable quantity of ferric-iron compounds. Results are always higher than the true acidity unless all ferric iron is reduced to ferrous iron prior to titration. A method is given whereby free-acid may be distinguished from acidity due to the hydrolysis of aluminum and iron salts and each estimated quantitatively by direct titration with fair accuracy. Ferric iron is reduced through addition of an excess of KI and later removing liberated iodine by adding a slight excess of sodium this sulphate just prior to titrating in the cold. The result gives true acidity nearly correct. Total acidity is determined through titration of a boiling sample and using phenolpthalein as indicator. Acids of hydrolysis are obtained by difference.—*L. H. Enslow.*

,**The Application of H-Ion Concentration Measurements to the Control of Industrial Processes.** Earl A. Keeler. Jour. Ind. and Eng. Chemistry, **14**: 395–397, May, 1922. A description of electrical equipment for making hydrogen-ion concentration measurements in industrial plants and elsewhere. It is suggested, among many other applications on a practical scale, that boilers should be equipped with such an instrument and that the recording of the hydrogen ion concentration of the water in the boilers or of the feed water be continuous. The economy of maintenance of a sufficiently acid-free water is stressed. At present the Leeds-Northrup Company has in operation an installation which automatically injects alkali into the boiler feed-water whenever the recording instrument indicates the water at the time to have too great a hydrogen ion concentration (acid content).

Although the water may react alkaline to erythrosine or methylorange solutions the carbon-dioxide content may be sufficiently high to make the water in reality acid or corrosive, thereby requiring added alkali to reduce the hydrogen ion content and create a less agressive boiler-water which will not attack the tubes so violently.—*L. H. Enslow.*

Control of Corrosion by De-aeration of Water. Frank N. Speller. Jour. of Franklin Institute, **193**: 515–42, April, 1922. A 27-page article on the subject of corrosion with special attention to corrosion of hot water pipes. The author discusses the various factors causing corrosion, the relation of the composition of the metal to corrosion, the rate of corrosion, protective coatings, etc. The solubility of oxygen in water under various conditions is discussed and the relation of oxygen to corrosion is pointed out. Various means for de-aerating are described, and both American and European practice is reviewed. The author recommends removal of a large portion of the oxygen by mechanical de-aeration, the last 10 per cent being removed by means of chemical de-aeration such as scrap iron or ferrous sulphate.—*A. M. Buswell.*

The City Bulletin, Columbus, Ohio, 7: April 15, 1922. Annual Report of the Division of Water, 1921. Operating records and financial data of the Division of Water are given. Water softening and purification works repairs included, re-surfacing of alum solution tanks and alum and soda ash dissolving tanks with a rich mortar, lining soda ash solution tanks with lead, reducing the speed of the lime conveyor to reduce breakage of gears, and placing heavy paddles in the lime solution tanks.—*G. C. Habermeyer.*

Further Experiments with Activated Sludge. E. HANNAFORD RICHARDS AND G. C. SAWYER. J. Soc. Chem. Ind., 41: 62 T, 1922. In a previous paper (J. S. C. I., 39, 177 T) the authors have compared the fertilizer value of various sewage sludges with that of activated sludge. The present paper deals with the nitrogen content of activated sludge as compared with other sludges, the availability of the nitrogen in activated sludge for plant food and the source of the high nitrogen content in activated sludge. The data include chemical analyses, bacterial counts and microscopic determinations of the number of protozoa. A relation was established between the number of protozoa and bacteria, and the high nitrogen in the activated sludge was attributed to synthetic living protein of the bodies of bacteria and protozoa. (See also Marshall's Microbiology, Third Edition, page 188, Abstractor's note.) Under certain conditions of aeration free ammonia and nitrates are synthesized into proteins, as contrasted with the formation of free ammonia and nitrates which is ordinarily observed in the activated sludge processes. In certain experiments practically all influent nitrogen was accounted for, while in others some nitrogen was lost. In no case was fixation of nitrogen observed.—*A. M. Buswell.*

Chemical and Biological Reaction in the Dorr-Peck Tank. A. M. BUSWELL, A. A. BRENSKY, AND S. L. NEAVE. Amer. Jour. of Pub. Health, 12: 299. Reports chemical data on the nitrogen cycle in the activated sludge process operating with low air, together with data on the performance of Dorr-Peck tank. With the low amounts of air used the action of the nitrifying organisms was reversed so that nitrates and ammonia were synthesized into protein. The nitrogen balanced showed that all nitrogen was accounted for within the limits of experimental error and that under the conditions of the experiment there was neither loss nor fixation of nitrogen. Attention is called to the lack of correlation between the volume and weight of activated sludge. The performance of the Dorr-Peck tank as designed for this experiment was not satisfactory and the apparatus has been withdrawn by the manufacturers.—*A. M. Buswell.*

Removing Boiler Scale with CO_2. R. J. CROSS AND ROY IRVIN. Power, 55: 422, March 14, 1922. A method is given for the laboratory treatment of boiler scales, high in lime and silica and comparatively low in carbonate, with carbonated water. Experiments were also made with horizontal return tubular boilers in which a hard and very adherent scale had accumulated during several years. A mixture of 100 lbs. of sal soda and 70 lbs. of lye per boiler did not remove the scale. One boiler was filled with boiled water free from dissolved gases and 3 cylinders or 150 lbs. of carbon dioxide were discharged into it. The temperature of the water was 84°F. After standing 8 days 287 lbs. of softened scale were removed. Almost half the surface of the boiler was free from scale and rust, and the exposed surface had the blue color of new tubes. A year later the treatment was repeated and more than 100 pounds of scale were removed, after which the boiler was practically free from scale. No cost figures are given.—*Geo. C. Bunker.*

The Point of Release on the Indicator Diagram. Power, 55: 424, March 14, 1922. Complete expansion can not be secured. Exhaust valves should open before the end of the stroke. No practical loss of energy occurs with early release.—*Geo. C. Bunker.*

Practical Information about Injectors. TERRELL CROFT. Power, 55: 460, March 21, 1922. How the different types work; advantages and disadvantages; applications; testing; selection; how to overcome operating troubles.—*Geo. C. Bunker.*

Reasons for the Peculiar Shapes of the Back Pressure Line of the Indicator Diagram. Power, 55: 464, March 21, 1922. Effect of decreased back pressure. —*Geo. C. Bunker.*

Why Complete Compression is Not Economical. Power, 55: 496, March 28, 1922. A discussion of the compression line on the indicator diagram, showing that compression to the initial pressure is not efficient. Description of a graphical method of finding proper compression for any given cutoff.—*Geo. C. Bunker.*

Reasons for Distorted Admission Lines on Indicator Diagrams. Power, 55: 538, April 4, 1922. Discusses the subject of lead and by typical diagrams shows the engineer the manner of admission line to avoid.—*Geo. C. Bunker.*

A Simple Test for Measuring Surface-Condenser Leakage. O. P. ADAMS AND P. F. HOOTS. Power, 55: 540, April 4, 1922. By the determination of chlorides in the hot well, returns, the cooling water, and in a condensate from the steam line, the percentage leakage of the condenser may be calculated.—*Geo. C. Bunker.*

Maintenance and Inspection of Storage Batteries. CHESTER SCHENCK. Power, 55: 571, April 11, 1922. Outline of inspection system; indications of short-circuits, sulphating and buckling and the remedies; treatment of weakened cells.—*Geo. C. Bunker.*

Indicator Diagrams. Power, 55: 574, April 11, 1922. Twenty-eight examples from Corliss, Una-Flow, and Non-Releasing Four Valve Engines.—*Geo. C. Bunker.*

Largest Station Using Pulverized Coal. Power, 55: 604, April 18, 1922. The Lakeside station of the Milwaukee Electric Railway and Light Co. Laid out for 200,000 kw. of which 40,000 kw. is installed.—*Geo. C. Bunker.*

How to Make Forms for Concrete Buildings—Columns. W. F. Lockhardt. Concrete, 20: 164, April, 1922. The third article of a practical series written for builders. The first article (February) was on Footings; the second (March) on Walls.—*Geo. C. Bunker.*

Hard Water and Health. Water and Water Eng. (London), 24: 82, March 20, 1922. Abstract of paper by Lincolne Sutton on water supplies of Norfolk and Suffolk. The hardness of Norfolk waters varies from 12 to 20 degrees (Clark) or 171 to 286 p.p.m. Norfolk has had an unenviable reputation for the prevalence of calculus for a long time, but the author takes the view that it can not be attributed to the local waters, and his conclusion is that: "In all probability, hard water is better for our young growing people, who require lime salt for the healthy development of their bones and teeth. Soft water may suit the aged, who, however, drink less with advancing years. To the average adult it is a matter of indifference."—*Geo. C. Bunker.*

Jerusalem New Water Supply. F. W. Stephen. Royal Engineers Jour., December, 1921, pages 261–8. Abstract; Water and Water Eng. (London), 24: 107, March 20, 1922. Describes water supply as found on occupation by British Army and additions made to enlarge it.—*Geo. C. Bunker.*

Supply of Drinking Water in Belgium. A. Mennes. Water en Gas. January 6, 1922, pages 4–5. Abstract; Water and Water Eng. (London), 24: 108, March 20, 1922. A review of the administrative and technical aspects of the supply of drinking water in Belgium.—*Geo. C. Bunker.*

The Provincial Supply of Drinking Water for North Holland. B. F. van Nievelt. Water en Gas. January 6, 1922, pages 2–3. Abstract; Water and Water Eng. (London), 24: 108, March 20, 1922. A choice had to be made between the system by which the water works enterprise acts as a wholesale supplier, leaving the distribution and fixing of tariffs to the local authority, and that by which it delivers directly to the inhabitants without any interference by the local administration. It was resolved to supply no district unless the local authorities made a by-law for the compulsory use of water from the mains in any house distant not more than 40 meters from the centre of the road in which there was a water main, except in cases where a good and sufficient supply was already at hand.—*Geo. C. Bunker.*

Condition and Behavior of Core Material in Hydraulic Fill Dams. C. H. Paul. Proc. Am. Soc. C. E., 48: 452–72, 1922. Eng. Cont., 57: 353. The construction of 5 dams on the Miami Conservancy project has shown

1. Gradation of core material may be controlled.
2. Excess of fines is required in borrowpit material, to control core and prevent encroachment of gravel and sand.
3. A reasonably wide core, (width at any point equal to height of dam above that point) is necessary.
4. A high percent of fine material in core is not objectionable, if properly graded.

5. Such cores show a satisfactory rate of consolidation.
6. Such cores are stable, after a few months of consolidation, in that they do not flow when outside slope material is removed.

Extended details are given on studies of design and construction.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Proposed Reservoir for Boston's Water Supply. X. H. Goodnough. Rept. Joint Board, 1922, Pub. Works, 52: 287–8. The report recommends construction of a reservoir 17 miles long, 4 miles wide, storing water of Swift, Ware and Miller Rivers, at a cost of $60,000,000.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

A Comparison of the Hardness of Public Water Supplies in Massachusetts, New York and New Jersey. W. S. Coulter. Mun. Cty. Eng., 62: 109–12, 1922. The average hardness found in parts per million is in Mass. surface water 18.2, ground 27.3; in N. J. surface 32.8, ground 64.1; in N. Y. surface 64.3, ground 155.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Design and Construction of Novel Concrete Conduit. W. A. Kunigh. Eng. Cont., 57: 347–351, 1922. A semi-circular conduit, 36 in. diam. with flat top, was built at Tacoma in 1921 with gunite, with a thickness of 3 in. No expansion joints are provided. The mix was 1:3 cement and sand. The excavation was cut to line and grade and then backfilled and tamped to the outside line of the invert. The top was made by precasting a reinforced slab which was then used as a base for the gunite. The cost per lineal foot was $7.07. The plant and organization are detailed.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Cleaning Irrigation Canals with Modified Disc Harrows. H. L. Crawford. U. S. Reclamation Rec., February, 1922. Eng. Cont., 57: 357–8, 1922. Modified disc harrow with 20-inch discs is very successful in removing moss from irrigation ditches. A team on each bank pulls the machine. The number of discs varies.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Cost of Water Main Construction at Hartford, Conn. Ann. Rep. Bd. Water Comm., March 1, 1921. Eng. Cont., 57: 346, 1922. Comparative costs are given for 4 to 16 inch pipe for years 1915 to 1920.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Cost of Water Main Construction, Water Meter Installation and Testing at Detroit. Report Bd. Water Commr., 1921. Eng. Cont., 57: 346, 1922. Costs of material, labor and expense are given for 2 to 48 in. pipe laid in 1920–21. For 6- and 8-inch cost was $2.63 and $3.67 respectively. The cost of installing meters (⅝ to 4 inches) is given, for ⅝- and ¾-inch being respectively $7.80 and $10.68. The cost of meter testing is also given.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Cost of Repairing Meters at Los Angeles. Report Bd. Pub. Service Comm., 1921. Eng. Cont., 57: 346, 1922. Details of costs of meter repair are given from ⅝ to 6 in. Average cost for ⅝ and ¾ in. meters was $1.51 and $2.01.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Gilboa Dam Construction. Pub. Wks., 52: 205–8, 1922. The exploration borings, pressure tests, river diversion, foundations, excavations and contractor's plant are described.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Scoring Water and Sewage Treatment Works. F. E. Daniels. Pub. Wks., 52: 135–8, 1922. Blank forms are shown for scoring plants.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Constructing Detroit Filter Plant. Pub. Wks., 52: 77–8, 1922. This is a description of contracting plant, for a rapid filter occupying an area of 500 x 800 feet. Two cableways were used. A central concrete mixing plant was provided.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Typhoid Fever in Detroit. F. M. Meader. Pub. Wks., 52: 78, 1922. Of 247 cases in four summer months in 1921, 43 were traceable to bathing in the Detroit River.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Typhoid Fever Record at Lawrence, Mass. Pub. Wks., 52: 62–3, 1922. The typhoid rate in this city of 100,000 has decreased, since installation of filters until in 1921 there were only 20 cases and one death.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Sensitive Detection of Suspended Matter. J. R. Baylis. Pub. Wks., 52: 6–7, 1922. A ray of light is passed through a 3-liter flask at right angles to the line of sight. The flask and light are enclosed. The device is very sensitive in a qualitative way.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

Western Avenue Tunnel Extension. Pub. Wks. 52: 1–4, 1922. A tunnel 11 feet 4 inches wide by 12 feet high inside, is being driven 33,000 feet in solid rock. The capacity is estimated at 800,000,000 gallons per twenty-four hours. The average force employed in 4 headings is 400 men. The cost will be about $4,000,000. The details of construction and plant are described. The rock is crushed and screened in a traveling apparatus. The concrete is mixed and distributed by pneumatic pressure.—*Langdon Pearse* (*Courtesy Chemical Abstracts*.)

Wood Stave Water Pipe. U. S. Reclamation Record, December, 1921. Pub. Wks., 52: 5, 1922. This is a summary of a questionnaire sent out by the Reclamation service, covering 196 installations. The data indicate life of pipe is shortened by intermittent service, alkali soil (destroying steel bands), separate wooden collars at joints, low heads. Wire wound fir does not last as well as redwood.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

The Organization of Metropolitan Districts. Langdon Pearse. Am. Soc. Mun. Impvt. 1921. Can. Eng., 42:227–30, 1922. Pub. Wks., 52: 12–13, 1922. A summary describing various metropolitan districts, organized for sanitary purposes, chiefly for sewerage or sewage treatment. Purposes, powers, and limitations are detailed.—*Langdon Pearse* (*Courtesy Chemical Abstracts*).

The Heat of Coagulation of Ferric Oxide Hydrosol with Electrolytes. F. L. Browne and J. H. Mathews. J. Amer. Chem. Soc., 43:2336–52, 1921. From Chem. Abst., 16:517, February 20, 1922. The heats of coagulation of Graham's ferric oxide hydrosol vary greatly with the nature of the electrolyte used, but in each case it becomes less as the hydrosol is further purified by dialysis. The heat effect on mixing dilute ferric chloride solutions with these electrolytes is sufficient to account for the thermal effects observed.—*R. E. Thompson.*

A Note on Colloidal Selenium. A. Gutbier and R. Emslander. Ber. 54B, 1974–1978, 1921. From Chem. Abst., 16: 517. February 20, 1922. The stability of colloidal selenium was found to be a function of the degree of dispersion. The more dilute the colloid the higher its dispersion and the longer the time required to coagulate it. On addition of certain electrolytes the yellow colloid became successively red, violet and blue, indicating a growth in the size of the particles. The addition of very small amounts of such substances as hydrochloric acid, sodium carbonate and potassium chloride, stabilized the colloid and prevented coagulation by freezing. Higher concentrations of these salts are efficient coagulants of this same colloid.—*R. E. Thompson.*

Colloidal Condition of Substances Slightly Soluble in Water and Other Solvents. I. Traube and P. Klein. Kolloid-Z., 29: 236–46, 1921. From Chem. Abst., 16: 518, February 20, 1922. By means of Tyndall cones and the ultramicroscope it has been shown that many difficultly soluble organic and inorganic substances are dissolved wholly or partly as colloids. It is pointed out that the colloidal nature of many poisons calls for experiments on the adsorption of these substances on the surfaces of blood corpuscles, yeast cells, bacteria, etc., as well as on the taking up of the poison within the cell.—*R. E. Thompson.*

A Very Sensitive Test for Copper: The Reaction of Kastel-Meyer. P. Thomas and G. Carpentier. Compt. rend., 173: 1082–5, 1921. From Chem. Abst., 16: 538, February 20, 1922. A solution of 2 grams of phenolphthalein and 20 gms. of pure potassium hydroxide in 100 cc. pure water will give a pink coloration with a solution containing 1 part of copper in 100,000,000 parts of water. The reaction may be used for the colorimetric determination of copper in water.—*R. E. Thompson.*

Volumetric Determination of Aluminium. E. J. Kraus. Chem.-Ztg., 45: 1173, 1921. From Chem. Abst., 16: 539, February 20, 1922. A volumetric method for the determination of aluminium is outlined as follows: Dissolve the precipitate of aluminium hydroxide in dilute sulphuric acid, render neutral and titrate with standard disodium hydrogen phosphate in the presence of a few drops of silver nitrate. The aluminium is precipitated as aluminium phosphate and the completion of the reaction is indicated by the formation of a yellow precipitate of silver phosphate.—*R. E. Thompson.*

The Probability of Effusion of Colloid Particles and Related Ideas. E. BUCHWALD. Ann. Physik, 66: 1–24, 1921. From Chem. Abst., 16: 515–6, February 20, 1922. The probability that a colloid particle originally in the finite volume, v, of a sol shall after a lapse of time no longer remain in v, was determined for different time intervals in the case of a selenium hydrosol. Smoluchowski's theory was in general confirmed, but a small systematic variation was observed.—*R. E. Thompson.*

Precipitation of Colloids by Nonconductors. P. KLEIN. Kolloid-Z., 29: 247–50, 1921. From Chem. Abst., 16: 516, February 20, 1922. Nonconductors, such as isoamyl alcohol, heptyl alcohol, chloroform, carbon tetrachloride, benzene, etc., caused the precipitation of negative colloids without the aid of electrolytes. The precipitating agent was dissolved in ethyl alcohol in order to obtain the finest possible sub-division. Electropositive sols, such as ferric hydroxide and aluminium hydroxide, were not precipitated.—*R. E. Thompson.*

Quantitative Methods for Coagulation of Suspensoids. F.-V. v. HAHN. Kolloid-Z., 29: 226–36, 1921. From Chem. Abst., 16: 516, February 20, 1922. The methods based on the precipitation of the colloid by an electrolyte were tested, and other methods developed. Exhaustive experiments showed that coagulation by boiling is probably due to an adsorption process at the surface between vapor and liquid.—*R. E. Thompson.*

The Protective and Flocculating Action of Hydrophilic Colloids and Hydrophobic Sols. H. FREUNDLICH AND E. LOENING. Festschrift Kaiser Wilhelm Ges. Förderung Wiss. Zehnjahrigen Jubiläum 1921, 82–89. From Chem. Abst., 16: 516, February 20, 1922. It was shown by experiments with both gold and silver sols, that the sensitization of a hydrophobic sol by a hydrophilic colloid is merely a coagulation which is too slight to become immediately observable. It can be detected only by the fact that when the sol is thus sensitized, smaller amounts of electrolytes are required for flocculation. The transition from coagulation to protective action observed by Gann is a general phenomenon, and is probably dependent on the fact that the oppositely charged hydrophilic sol in low concentration coagulates the particles of the hydrophobic sol, whereas in higher concentration the former actually envelops and thus protects them.—*R. E. Thompson.*

Value of Flue Gas Analysis. A. B. HELBIG. Feuerungstechnik, 9: 229–34, 1921. From Chem. Abst., 16: 634, February 20, 1922. A formula is developed by means of which the heating value of the coal can be calculated from the analysis of the flue gases.—*R. E. Thompson.*

Effect of Sea Water on Concrete Structures. C. E. W. Dodwell. Cement Eng. News, 33: 29–30, 1921. From Chem. Abst. 16: 624, February 20, 1922. A brief report on the experience with concrete piers at Annapolis Royal, N. S. Most of the disintegration was due to freezing and the abrasive action of floating ice.—*R. E. Thompson.*

Boiler Plant Efficiency. V. J. Azbe. Mech. Eng. 43: 722–4, 726, 1921. From Chem. Abst. 16: 633, February 20, 1922. Ninety per cent efficiency (representing boiler and economizer only) is attainable under favorable conditions, but the requirements are severe. With 12000 B. t. u. coal, 15 per cent excess air would have to be used, flue-gas temperature would have to be not more than 250°F., combustion complete, and no carbon in the ash. The requirements of the ideal boiler installation of today are summarized.—*R. E. Thompson.*

Determination of the Carbon Dioxide Content of Flue Gases from the Firing of Steam Boilers. H. Winkelmann. Braunkohle 20: 307–310, 326–329, 1921. From Chem. Abst. 16: 635, February 20, 1922. The important theoretical principles of combustion and the various methods of determining carbon dioxide in flue gases are dealt with.—*R. E. Thompson.*

Report on Water. J. W. Sale. J. Assoc. Official Agr. Chem., 5: 29–32, 1921; cf. C. A. 15, 2139. From Chem. Abst. 16: 453, February 10, 1922. The average error in the results obtained by the tentative method for the determination of bromine in presence of chlorine and iodine was found to be 5.6 per cent. Determination of nitrates in water by addition of dilute phenoldisulphonic acid to the sample before evaporation and omitting the removal of chlorine with silver sulphate was found to be unsatisfactory.—*R. E. Thompson.*

Annual Report of The Copenhagen Waterworks for the Year 1910–1911. Anon. Pub. Health Eng. Absts., December 10, 1921. From Chem. Absts., 16: 453, February 10, 1922. Ninety-seven per cent of the supply is derived from wells, and the average daily consumption is 117 liters per capita. The works consist of two filter plants of 9 and 3 units respectively, and two aerating stations for the oxidation of iron.—*R. E. Thompson.*

Further Studies on the Application of Ozone to the Purification of Swimming Pools. W. A. Manheimer. Med. Record, 100: 851–2, 1921. Pub. Health Eng. Absts., December 10, 1921. From Chem. Abst. 16: 455, February 10, 1922. From a series of tests with ozone for purifying swimming pool waters at the U. S. Military Academy and public institutions in Cleveland and Lincoln, Nebraska, the treatment is considered satisfactory.—*R. E. Thompson.*

Determination of Sulfurous Acid. V. Coppetti. Ann. chim. anal. chim. appl., 3: 327–30, 1921. From Chem. Abst., 16: 540, February 20, 1922. An apparatus, designed to prevent the loss of iodine in the Haas method of determining sulfurous acid, is described. The apparatus consists of a 300-cc. flask connected by ground-glass stopper to upper chambers which serve as a condenser and as receptacles for iodine and sodium thiosulfate solutions. The sulfur dioxide is expelled from the solution under examination by a stream of carbon dioxide and is absorbed by iodine solution in one of the upper chambers, any iodine carried off by the current of gas being collected in the second chamber containing sodium thiosulfate. When the operation is complete the contents of both chambers are mixed and the excess iodine determined by titration.—*R. E. Thompson.*

Water of Borax Lake. R. C. Wells. J. Wash. Acad. Sci., **11**: 477–81, 1921. From Chem. Abst., **16**: 543–544, February 20, 1922. Recent analyses indicate that the water of Borax Lake has changed in composition. "In order to represent the dissolved alkaline matter in the form of the customary buffer salts an artificial water, containing 18.5 grams sodium chloride, 0.5 magnesium chloride, 1.0 potassium chloride, and 0.03 calcium sulphate per liter, was made up as a medium to which buffer salts could be added and the resulting pH values determined. A set of pH determinations were then made with various proportions of sodium carbonate and sodium bicarbonate; the total carbon dioxide was kept equal to that found in the lake water. Another similar set was made with mixtures of borax and sodium metaborate; the total B_2O_3 was kept the same as found in the lake water." The pH value of the water was 9.75. To yield this figure the salts should be distributed, in grams per liter, as follows: sodium carbonate 5.9, sodium bicarbonate 3.5, sodium metaborate 2.17, borax 0.68. These findings are compared with those of Searles Lake brine in which pH equals 9.48.—*R. E. Thompson.*

The Water Supply of The Egyptian Expeditionary Force, with Special Reference to the Efficiency of Mechanical Rapid Filtration with Chlorination. R. J. S. McDowell. J. Hyg., **19**: 305–8, 1921. From Chem. Abst., **16**: 601, February 20, 1922. A physiological experiment on a large scale proved that rapid filtration and chlorination methods of treatment can render an initially highly polluted and dangerous water safe for human consumption.—*R. E. Thompson.*

The Determination of Phosphate in Waters. D. Florentine. Ann. chim. anal. chim. appl., **3**: 295–296, 1921. From Chem. Abst., **16**: 601, February 20, 1922. The phosphorous pentoxide content of a stream of water may indicate pollution. The following modification of Deniges method has been found satisfactory for quantities of 0.01–5 p.p.m. Two reagents are required, (1) 100 cc. of 10 per cent ammonium molybdate mixed with 300 cc. of 50 per cent sulphuric acid. (2) 0.1 gram of tin dissolved in 2 cc. of pure hydrochloric acid containing a trace of copper salt, and diluted to 10 cc. Procedure: To 10 cc. of the water add 3 to 4 drops of reagent (1) and 1 drop of reagent (2) (or 3 drops for quantities greater than 2 p.p.m. Allow to stand 10 minutes and compare the blue color produced with standards containing known amounts of phosphates. More permanent standards can be prepared from an organic dyestuff such as indigo carmine. Orthoarsenic acid is the only substance that has been found to interfere with the test. Larger quantities of phosphates should be determined by precipation as ammonium phosphomolybdate, using 10 cc. of a 10 per cent nitric acid solution of ammonium molybdate for 25 cc. of water.—*R. E. Thompson.*

Iron Bacteria in Relation to the Incrustation of Pipes. D. ELLIS. Engineering, 112: 457–458, 1921. From Chem. Abst., 16: 601–602,Fe bruary 20, 1922. Five species of iron bacteria, Leptothrix ochracea, Gallionella ferruginea, Cladothrix dichotoma, Crenothrix polyspora, and Spirophyllum ferrugineum cause iron troubles. These bacteria are saprophytes and require organic matter and certain mineral ingredients (iron is not essential) for favorable growth. Acid waters are more favorable than alkaline waters, a reduction in acidity diminishing the power of the bacteria to harm. These growths are classified as (1) slimy streamers, (2) tubercular incrustations, (3) iron incrustations, and (4) spongy disease of cast iron, and each is discussed separately, giving causes and remedies.—*R. E. Thompson.*

Physical Chemical Study of the Absorbent Power of Soils. LUIGI CASALE. Staz. sper. agrar. ital., 54: 65–113, 1921. From Chem. Abst., 16: 604, February 20, 1922. This is a detailed discussion of the absorbent powers of soils, based on the fact that the conditions controlling absorption by soils are identical with those governing absorption by colloids.—*R. E. Thompson.*

Hard Pan in the Apulian Soils and Its Origin. A. DE DOMINICIS. Ann. scuola agr. Portici, 15: 1–39, 1919. Bull. Agr. Intelligence, 11: 292–293, 1920. From Chem. Abst., 16: 606, February 20, 1922. The position of the hard pan is indicated by the layer where the capillary water meets the solution running through the soil, its formation being due to the reactions taking place when the two waters mix. These reactions are similar to the coagulations which take place through the action of electrolytes upon hydrosols, the latter occurring as colloidal substances in the circulating water, while dissolved calcium carbonate serves as an electrolyte in the capillary water.—*R. E. Thompson.*

Portland Cement—Its Testing and Specification. R. E. STRADLING. Concrete and Constr. Eng., 16: 169–177, 223–233, 1921. From Chem. Abst., 16: 623, February 20, 1922. The essential properties of cement as an engineering material are: setting time within workable limits, soundness, and strength sufficient for requirements. When cement is mixed with water a considerable portion usually does not hydrate thus causing waste. The hydration is apparently affected by (1) fineness of grinding, (2) manner and amount of mixing, (3) amount of water used, and (4) temperature of water used.—*R. E. Thompson.*

Protecting Reinforced Concrete from Marine Deterioration. F. E. WENTWORTH-SHIELDS. Engineering, 112: 73, 1921. From Chem. Abst., 16: 624, February 20, 1922. The types of failure in marine structures are discussed and the various methods of preventing deterioration due to sea water reviewed, including rendering the concrete highly impermeable, integral mixtures, and surface coatings.—*R. E. Thompson.*

Deterioration of Reinforced Concrete Structures above Mean Tide Level. L. H. SAVILE. Engineering, 112: 73–74, 1921. From Chem. Abst., 16: 624, February 20, 1922. This subject is briefly discussed and a number of possible explanations of phenomenon advanced. The concrete below water level remains saturated with water and any dissolved oxygen removed by oxidation is not easily replaced. The water probably becomes very slightly alkaline, which would account for the non-appearance of rust below the line of saturation.—*R. E. Thompson.*

Waterproofing Concrete by Hydrated Lime Process. B. Nagy. Cement Eng. News, 33: 27–28, 1921. From Chem. Abst., 16: 624, February 20, 1922. The permeability of concrete, and the necessary characteristics of a material for use in decreasing the permeability are discussed. Hydrated lime possesses these characteristics.—*R. E. Thompson.*

External Corrosion of Mains and Services. J. G. Taplay. Gas J., 156: 210–211, 1921. From Chem. Abst., 16: 635–636. February 20, 1922. In built-up ground, acid in character and containing decayed vegetable matter, dextrose, ferrous acetate, calcium acetate, calcium formate, calcium nitrate, and calcium nitrite, corrosion was due to bacterial action with the formation of acetic acid. Corrosion of pipes laid in alkaline soils or in plaster walls was caused by calcium bicarbonate and water. The latter reaction is dealt with in detail. —*R. E. Thompson.*

The Chlorination of Small Water Supplies. F. B. Jones. Canadian Medical Assoc. J., 11: 908–910, December, 1921. Chlorination, although considered by the author to be only a more or less temporary means of purification, was found effective in eliminating the colon-typhoid group of bacteria from water. The use of galvanized pipe and fittings, and the application of a good mineral or asphaltum paint to wooden barrels materially assists in reducing corrosion due to hypochlorite solutions to a minimum. A special drip nozzle, by means of which the application of hypochlorite solution can be accurately controlled, is described in detail. The following procedure is recommended for the disinfection of wells. Apply a solution of calcium hypochlorite in the proportion of 1 pound of hypochlorite to every 332.6 cubic feet of water contained in the well (5 parts per million of available chlorine), allow to stand 24 hours and then pump dry.—*R. E. Thompson.*

The Bradford Water Supply. L. Mitchell. Surveyor, 61: 43–45, January 20, 1922 and 61: 133–135, February 3, 1922. The water supply of Bradford (England) is described in detail. The comparative softness (2.5 deg.) of the supply is of great economic importance to the community. For domestic use, in addition to the saving in soap, there is also a considerable reduction in the amount of tea required. From a commercial point of view the greatest advantage is, of course, the absence of scale in boilers, ⅛ inch of scale necessitating the use of 16 per cent more fuel, ¼ inch 50 per cent and ½ inch 150 per cent. The filters in use are of the ordinary slow-sand type, but the author states that the results obtained from mechanical or pressure filters, introduced in England from America, are practically identical with those from the best slow-sand filters. The daily consumption is 18,000,000 gallons (supplying a population approaching 400,000), this amount corresponding to a per capita consumption of 46 gallons as compared with the average of 35 gallons for the principal cities in Great Britain. The installation of a house meter system is considered impracticable owing to the amount of capital involved and to the cost of inspection and repairs.—*R. E. Thompson.*

Statistical Record of Toronto Water. Laboratory observations recorded during a ten-year period of purification, 1912–1921. Norman J. Howard. Canadian Engineer, 42:19, May 9, 1922. Brief résumé of water purification in chronological order is given. Extensive nature of the laboratory work carried out in Toronto is described in detail. During 1921 no less than 21,028 samples were examined. Methods of analysis as recommended by the American Public Health Association are criticised, tests for the isolation of the colon bacillus having been found particularly inconclusive and unsatisfactory. Addition of 0.5 per cent of sodium taurocholeate to lactose broth is suggested as being not too inhibitory and particularly favourable to the propagation of the colon group. Attention is directed to the incomplete reports frequently issued by laboratories, which it is claimed are often misleading due to lack of details and incompleted tests. The system of application of alum and chlorine to the water is given, aluminium sulphate being added for clarification purposes while chlorine is added both before and after filtration. Bacteriological figures show pollution of raw Lake Ontario water to have yearly increased, following the normal increase of population and industrial development, and attention is directed to this condition applying generally throughout the American continent. Reasons given are the discharge of untreated sewage and industrial wastes into the Lake, and the expressed desire of municipalities to withold spending large sums of money on disposal works pending the further development of sewage purification. The effect of pollution on the efficiencies of the filtration plants is shown in the tables, the slow sand plant giving an effluent purer than the water from the mechanical plant. Residual alum is found in the mechanically filtered water in colloidal form, which produces after precipitation, has shown no evidence of protecting bacteria against the sterilising effect of chlorine and is regarded as being of no sanitary significance. It is assumed that the hydrogen ion concentration of the water is particularly favourable to this condition, the after precipitation of alum experienced in some instances being due to the pH being below 6.8. Filter operation is briefly touched upon, attention being directed to the practice of raking the surface of the slow sand filters to increase the length of run, which custom is apparently prohibited in Europe. When the raw water is physically good, chlorine is applied to the mechanical plant prior to filtration instead of alum. By doing this an actual saving of $35,000 was made in 1921 and purer water obtained. Considerable space is given to bacterial concentration and its relationship to seasonal efficiency of the plants. The greatest concentration is found to occur in the summer months when the slow sand plant produces the greatest efficiency, and the mechanical plant gives the lowest purification. Biological activity is claimed to control the slow sand purification. The writer claims that the lower efficiencies obtained in the mechanical plant during the summer months, is not controlled by variations of the hydrogen ions but is due to great bacterial concentration and organic colloids. Application of chlorine shows that nearly twice as much is used in the warm weather when the water temperature rises. Taste occurring in the early spring and fall is attributed to the formation of chlorophenols, and the lack of taste in the summer months to increased biological activity which is claimed to prevent the formation of certain chemical compounds. During the past twelve years since the treatment of the water began, a remarkable decline in typhoid fever has occurred, the rate falling from 40.8 in 1910 to 3.0 in 1921. This is attributed to filtration and final sterilisation of the water supply.—*Norman J. Howard.*

Chlorination, Tastes and Odors. EDITORIAL. Canadian Engineer, 42:18, May 2, 1922. One of chief problems sanitarians are called upon to investigate is occurrence of taste and odor in water. Taste resulting from excessive algae growths are not common in Canada, because storage and impounding reservoirs are not extensively used. Chief problem is taste following application of chlorine for sterilisation purposes, which is attributed to formation of chloro-phenols following the discharge of industrial wastes into streams from which public supplies are drawn. Assuming that this is the cause, legislation should be framed to prevent the indiscriminate discharge of effluents into sewerage systems. It is likely that many industrial plants could recover by-products from their trade wastes which would not only compensate them for labor and expense involved, but might actually be instrumental in preventing taste in water treated with chlorine. It may be found that when taste occurs from chloro-phenols, there are definite quantities of each reagent which combine and cause taste, and that a decrease or increase of chlorine may be the solution. With so many of the leading chemists working on the problem, a solution to the question is anticipated at an early date. —*Norman J. Howard.*

Correction: On p. 533, May, 1922, Abstracts section, read "Iowa" for "Ohio" under "Rules and Regulations."—*Ed.*